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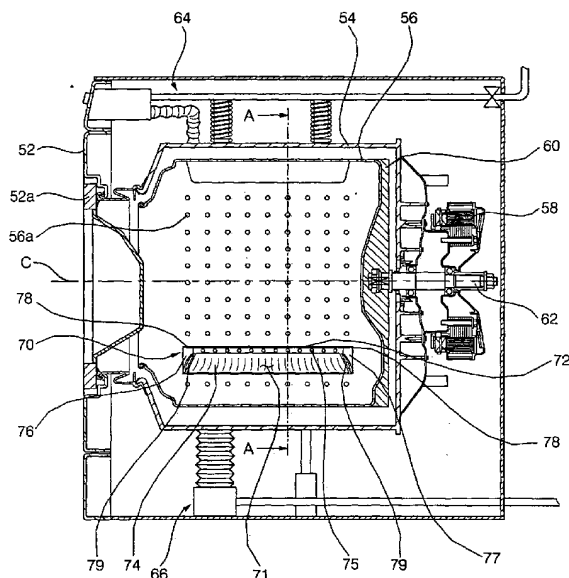
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**(54) Drum-type washing machine and lift unit thereof**

(57) Disclosed are a lift unit for a drum-type washing machine, and a drum-type washing machine comprising the lift unit. The lift unit is protruded from an inner wall of a drum for lifting the laundry in the drum, and comprises a water storage unit formed at at least one side surface of the lift unit for lifting and dropping the wash

water when the drum is rotated. The lift unit lifts the wash water to a designated height and then drops the wash water according to the rotation of the drum, thereby circulating the wash water in circumferential and vertical directions of the drum, forming various water currents, and improving washing and rinsing efficiency.

FIG. 3



## Description

### BACKGROUND OF THE INVENTION

#### Field of the Invention

[0001] The present invention relates to a drum-type washing machine, and more particularly to a lift unit, for a drum-type washing machine, for lifting and dropping laundry together with wash water when a drum is rotated.

#### Description of the Related Art

[0002] Generally, a drum-type washing machine has a structure, in which a tub and a drum are arranged in a horizontal direction and the drum containing laundry is rotated under the condition that wash water and a detergent are introduced into the drum, thereby washing the laundry.

[0003] Fig. 1 is a longitudinal-sectional view of a conventional drum-type washing machine, and Fig. 2 is a perspective view of a lift of the conventional drum-type washing machine.

[0004] As shown in Fig. 1, the conventional drum-type washing machine comprises a cabinet 2 provided with an opening formed through a front surface thereof, a door 2a installed at the cabinet 2 for opening and closing the opening of the cabinet 2, a tub 4 horizontally arranged in the cabinet 2 for containing wash water therein, a drum 6 rotatably arranged in the tub 4 for containing the laundry and rotated to wash the laundry, a motor 8 installed at a rear surface of the tub 4 for generating a rotary power, a spider 10 interposed between the motor 8 and the drum 6 and fixed to a rear surface of the drum 6 for transmitting the rotary power, and a rotary shaft 12 connected to the spider 10 and the motor 8.

[0005] The tub 4 and the drum 6 have a cylindrical shape, and front ends thereof are opened for putting the laundry into the tub 4 and the drum 6 therethrough.

[0006] A plurality of dehydration holes 6a are formed through a circumference of the drum 6. A plurality of lifts 20 are protruded from the inner wall of the drum 6 so that the lifts 20 are spaced from each other by a designated interval, thereby lifting and then dropping the wash water in accordance with the rotation of the drum 6.

[0007] The lifts 20 are located on the inner wall of the drum 6 and spaced from each other in a circumferential direction by the designated interval so that the lifts 20 are parallel with a rotary axis (C) of the drum 6.

[0008] Particularly, as shown in Fig. 2, each of the lifts 20 includes left and right upward sloping sides 22 and 24 so that top ends of the left and right sloping sides 22 and 24 are connected, and front and rear sides 26 and 28 contacting front and rear ends of the left and right sloping sides 22 and 24. A bottom surface of each of the lifts 20 is opened so that the wash water circulates in

the lifts 20, and holes 20a are formed through a top surface of each of the lifts 20 so that the wash water passes through the holes 20a of the lifts 20.

[0009] The lifts 20 are rotated together with the rotation of the drum 6. Thereby, the lifts 20 lift the laundry located on the bottom of the drum 6 along the circumference of the drum 6 to a designated height, and then drop the laundry to the bottom of the drum 6.

[0010] The drum-type washing machine provided with the lifts 20 is operated in wash and rinse modes due to friction generated between the laundry and the wash water when the laundry is rotated together with the rotation of the drum 6, and impact generated by a head caused by lifting and dropping the laundry by means of the lifts 20.

[0011] The conventional drum-type washing machine provided with the lifts 20 is operated in the wash and rinse modes by a current in the wash water having a designated pattern created by the centrifugal force generated by the rotation of the drum 6, and particularly, the lifts 20 lift and transfer the laundry contained in the drum 6. Accordingly, the conventional drum-type washing machine is disadvantageous in that it does not form a complicated water current and has a limit in improving washing and rinsing efficiency.

### SUMMARY OF THE INVENTION

[0012] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a lift unit for a drum-type washing machine, which is rotated together with the rotation of a drum, and lifts and drops a designated quantity of wash water and laundry, and a drum-type washing machine comprising the lift unit, thereby forming various currents in the wash water and improving washing and rinsing efficiency.

[0013] In accordance with one aspect of the present invention, the above and other objects can be accomplished by the provision of a lift unit for a drum-type washing machine, which is protruded from an inner wall of a drum for containing the laundry in the drum, comprising a water storage unit formed at at least one side surface of the lift unit for lifting and dropping the wash water when the drum is rotated.

[0014] Preferably, the lift unit may be protruded from the inner wall of the drum in a longitudinal direction of the drum, and comprise water storage units respectively formed at both side surfaces of the lift unit.

[0015] Further, preferably, both side surfaces of the lift unit may have a tapered structure so that a width of a top surface thereof is smaller than a width of a bottom surface thereof, and the water storage units are respectively formed at both side surfaces of the lift unit.

[0016] Moreover, preferably, a plurality of holes may be formed through a top surface of the lift unit so that the wash water passes through the holes of the lift unit, and a bottom surface of the lift unit may be opened.

[0017] Preferably, the water storage unit may include a water storage surface concaved into the side surface of the lift unit; and a partition surrounding a circumference of the water storage surface.

[0018] In accordance with another aspect of the present invention, there is provided a drum-type washing machine comprising: a cabinet provided with a door installed at a front surface thereof; a tub horizontally and supportably arranged in the cabinet; a drum rotatably installed in the tub for achieving washing of laundry; driving means installed at a rear surface of the tub for rotating the drum; and lifts, for containing wash water, protruded from an inner wall of the drum for containing the laundry in the drum, spaced from each other by a designated interval in a circumferential direction of the drum, and provided with water storage units formed at at least a part of side surfaces of the lifts.

[0019] The lift unit of the drum-type washing machine of the present invention comprises the water storage surfaces formed on both side surfaces, and lifts wash water to a designated height and then drops the wash water according to the rotation of the drum, thereby circulating the wash water in circumferential and vertical directions of the drum, forming various water currents, and improving washing and rinsing efficiency.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

- Fig. 1 is a longitudinal-sectional view of a conventional drum-type washing machine;
- Fig. 2 is a perspective view of a lift of the conventional drum-type washing machine;
- Fig. 3 is a longitudinal-sectional view of a drum-type washing machine in accordance with the present invention;
- Fig. 4 is a perspective view of a lift of the drum-type washing machine in accordance with the present invention; and
- Figs. 5A, 5B and 5C are schematic cross-sectional views taken along the line A-A of Fig. 3, illustrating operation of the lift of the drum-type washing machine in accordance with the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Now, preferred embodiments of the present invention will be described in detail with reference to the annexed drawings.

[0022] Fig. 3 is a longitudinal-sectional view of a drum-type washing machine in accordance with the present invention. Fig. 4 is a perspective view of a lift of

the drum-type washing machine in accordance with the present invention.

[0023] As shown in Fig. 3, the drum-type washing machine in accordance with the present invention comprises a cabinet 52 provided with an opening formed through a front surface thereof, a door 52a installed at the cabinet 52 for opening and closing the opening of the cabinet 52, a tub 54 horizontally arranged in the cabinet 52 for containing wash water therein, a drum 56 rotatably arranged in the tub 54 for containing laundry and rotated to wash the laundry, a motor 58 installed at a rear surface of the tub 54 for generating a rotary power, a spider 60 interposed between the motor 58 and the drum 56 and fixed to a rear surface of the drum 56 for transmitting the rotary power, a rotary shaft 62 connected to the spider 60 and the motor 58, and a plurality of lifts 70 protruded from the inner wall of the drum 56 in a longitudinal direction of the drum 56 so that the lifts 70 are spaced from each other in a circumferential direction by a designated interval, thereby lifting and dropping the wash water and the laundry in accordance with the rotation of the drum 56. Here, each of the lifts 70 is provided with a water storage unit 71.

[0024] The drum-type washing machine of the present invention further comprises a water feed unit 64 for feeding the wash water into the tub 54 and the drum 56 in a wash mode, and a drain unit 66 for discharging the wash water from the tub 54 and the drum 56 to the outside therethrough in rinse and dehydration modes.

[0025] The tub 54 and the drum 56 has a cylindrical shape, and front ends thereof are opened for putting the laundry into the tub 54 and the drum 56 therethrough.

[0026] A plurality of dehydration holes 56a are formed through a circumference of the drum 56. The lifts 70 are protruded from the inner wall of the drum 56, and spaced from each other in a circumferential direction by the designated interval so that the lifts 70 are parallel with a rotary axis (C) of the drum 56.

[0027] As shown in Fig. 4, each of the lifts 70 includes both side surfaces, which slope upward so that the width of a top surface is smaller than that of a bottom surface, and front and rear surfaces 76 and 77 contacting front and rear ends of both the side surfaces.

[0028] The water storage unit 71 of each of the lifts 70 includes left and right water storage surfaces 72 and 74 concaved into the side surfaces, and first and second partitions 78 and 79 extended from the front and rear surfaces 76 and 77 perpendicularly to the left and right water storage surfaces 72 and 74 so that the wash water contained by the left and right water storage surfaces 72 and 74 does not flow toward the front and rear ends of the side surfaces.

[0029] A bottom surface of each of the lifts 70 is opened so that the wash water circulates in the lifts 70, and holes 75 are formed through a top surface of each of the lifts 70 so that the wash water passes through the holes 75 of the lifts 70.

[0030] Accordingly, the water storage unit 71 of each

of the lifts 70 includes a left water storage subunit, which contains the wash water, between the left water storage surface 72 and the first partition 78, and a right water storage subunit, which contains the wash water, between the right water storage surface 74 and the second partition 79.

**[0031]** As shown in Fig. 5A, the left water storage surface 72 is located in the way of a forward rotational direction (P) of the drum 56, and has a concave shape for containing the wash water in case that the drum 56 is rotated in the forward direction. On the other hand, the right water storage surface 74 is located in the way of a backward rotational direction (Q) of the drum 56, and has a concave shape for containing the wash water in case that the drum 56 is rotated in the backward direction.

**[0032]** The first and second partitions 78 and 79 are extended from the front and rear surfaces 76 and 77 perpendicularly to the front and rear ends of the left and right water storage surfaces 72 and 74. Upper ends of the first and second partitions 78 and 79 respectively connect upper and lower ends of the left and right water storage surfaces 72 and 74 in a straight line.

**[0033]** Here, the left and right water storage surfaces 72 and 74 have a concave shape for lifting the wash water to a designated height and then dropping the wash water. However, the left and right water storage surfaces 72 and 74 may have various shapes rather than the concave shape.

**[0034]** Hereinafter, operation of the drum-type washing machine of the present invention will be described in detail.

**[0035]** Figs. 5A, 5B and 5C are schematic cross-sectional views of the drum-type washing machine of the present invention in a wash or rinse mode.

**[0036]** First, when the drum-type washing machine is operated, a quantity of foam is sensed, and wash water is supplied into the tub 54 and the drum 56 to a designated level. Then, the drum 56 is rotated in a forward or backward direction in accordance with the rotation of the motor 58, thereby achieving the wash and rinse modes of the drum-type washing machine.

**[0037]** When the drum 56 is rotated, the lifts 70 installed at the inner wall of the drum 56 are rotated so that the laundry located on the bottom of the drum 56 is lifted by the lifts 70, transferred to a designated height in a circumferential direction of the drum 56, and then dropped to the bottom of the drum 56, thereby washing and rinsing the laundry due to a head of water.

**[0038]** Here, in case that the drum 56 is rotated in the forward direction (P) as shown in Figs. 5A, 5B and 5C, the left water storage subunit, having the shape of a groove formed between the left water storage surface 72 and the first partition 78, of the water storage unit 71 of each of the lifts 70 lifts the wash water to a designated height and then drops the wash water.

**[0039]** On the other hand, in case that the drum 56 is rotated in the backward direction (Q), the right water

storage subunit, having the shape of a groove formed between the right water storage surface 74 and the second partition 79, of the water storage unit 71 of each of the lifts 70 lifts the wash water to a designated height and then drops the wash water.

**[0040]** Accordingly, the drum-type washing machine lifts the wash water to a designated height, and then drops the wash water by the lifts 70 according to the rotation of the drum 56, thus allowing the wash water to collide with the laundry in the drum 56. Thereby, it is possible to achieve the same effect as beating the laundry with ones hands, thus improving washing efficiency. Further, the drum-type washing machine circulates the wash water in a vertical direction of the drum 56 as well as in a circumferential direction of the drum 56, thus forming various water currents and achieving the same effect as rubbing the laundry with ones hands. Thereby, it is possible to improve washing and rinsing efficiency.

**[0041]** As apparent from the above description, the present invention provides a lift unit, for a drum-type washing machine, comprising a water storage unit including water storage subunits formed on both sides of the lift unit, which lifts wash water to a designated height and then drops the wash water according to the rotation of a drum, thereby achieving the same effect as beating the laundry with ones hands. Further, the lift unit circulates the wash water in a vertical direction of the drum as well as in a circumferential direction of the drum so as to form various water currents, thereby achieving the same effect as rubbing the laundry with ones hands. Accordingly, the lift unit of the drum-type washing machine of the present invention improves washing and rinsing efficiency.

**[0042]** Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

## Claims

1. A lift unit for a drum-type washing machine, which is protruded from an inner wall of a drum for containing laundry in the drum, comprising:

a water storage unit formed at at least one side surface of the lift unit for lifting and dropping the wash water when the drum is rotated.

2. The lift unit as set forth in claim 1, wherein the lift unit is protruded from the inner wall of the drum in a longitudinal direction of the drum, and comprises water storage units respectively formed at both side surfaces of the lift unit.

3. The lift unit as set forth in claim 1,

wherein both side surfaces of the lift unit have a tapered structure so that a width of a top surface thereof is smaller than a width of a bottom surface thereof, and the water storage units are respectively formed at both side surfaces of the lift unit.

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4. The lift unit as set forth in claim 1,  
wherein a plurality of holes are formed through a top surface of the lift unit so that the wash water passes through the holes of the lift unit, and a bottom surface of the lift unit is opened. 10
5. The lift unit as set forth in claim 1,  
wherein the water storage unit includes:  
  
a water storage surface concaved into the side surface of the lift unit; and  
a partition surrounding a circumference of the water storage surface. 15  
20
6. The lift unit as set forth in claim 5,  
wherein the lift unit is protruded from the inner wall of the drum in a longitudinal direction of the drum, and comprises water storage units respectively formed at both side surfaces of the lift unit. 25
7. The lift unit as set forth in claim 5,  
wherein both side surfaces of the lift unit have a tapered structure so that a width of a top surface thereof is smaller than a width of a bottom surface thereof, and the water storage units are respectively formed at both side surfaces of the lift unit. 30
8. The lift unit as set forth in claim 5,  
wherein a plurality of holes are formed through a top surface of the lift unit so that the wash water passes through the holes of the lift unit, and a bottom surface of the lift unit is opened. 35
9. A lift unit for a drum-type washing machine, comprising:  
  
lifts protruded from an inner wall of a drum and spaced from each other by a designated interval in a circumferential direction; 45  
water storage units formed at both side surfaces of the lifts and having a tapered structure so that a width of a top surface of each of lifts is smaller than a width of a bottom surface of each of the lifts for lifting and dropping the wash water when the drum is rotated; and 50  
a plurality of holes formed through the top surface of each of the lifts so that the wash water passes through the holes of the lifts. 55
10. The lift unit as set forth in claim 9,  
wherein each of the water storage units includes:

water storage surfaces respectively concaved into both side surfaces of the lift; and partitions surrounding front and rear ends of the water storage surfaces.

#### 11. A drum-type washing machine comprising:

a cabinet provided with a door installed at a front surface thereof;  
a tub horizontally and supportably arranged in the cabinet;  
a drum rotatably installed in the tub so that laundry is washed in the drum;  
driving means installed at a rear surface of the tub for rotating the drum; and  
lifts protruded from an inner wall of the drum for containing the laundry in the drum, spaced from each other by a designated interval in a circumferential direction of the drum, and provided with water storage units, for storing a designate quantity of wash water, formed at at least a part of side surfaces of the lifts.

FIG. 1 (Prior Art)

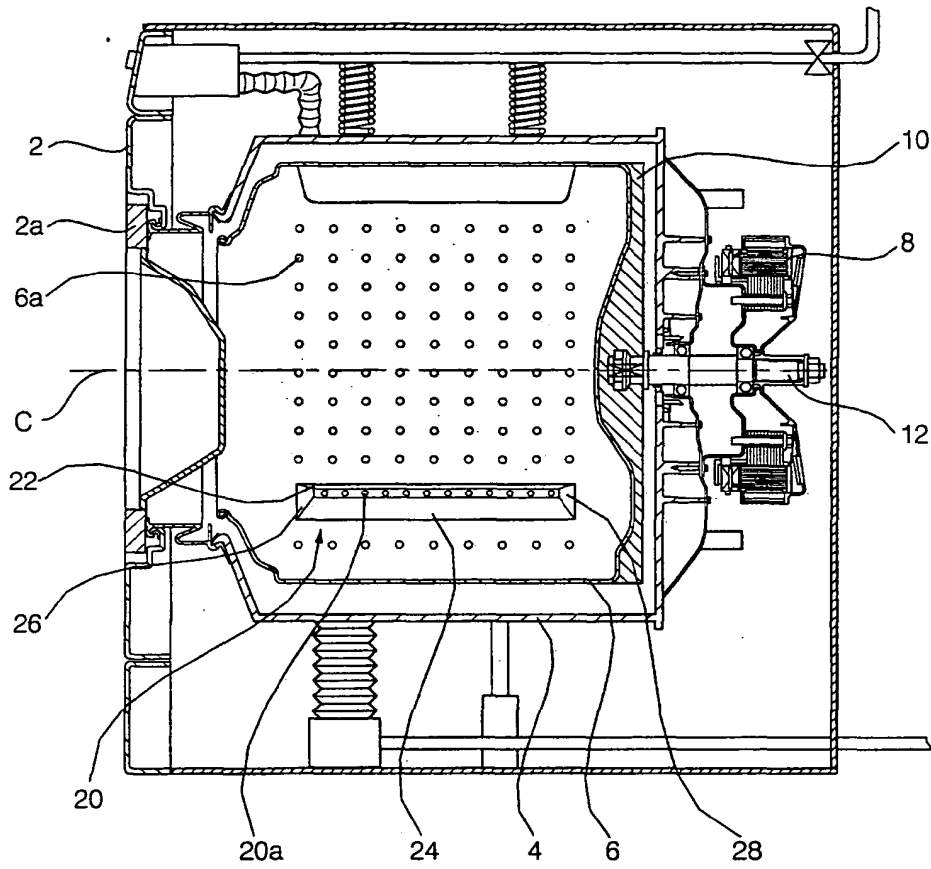


FIG. 2 (Prior Art)

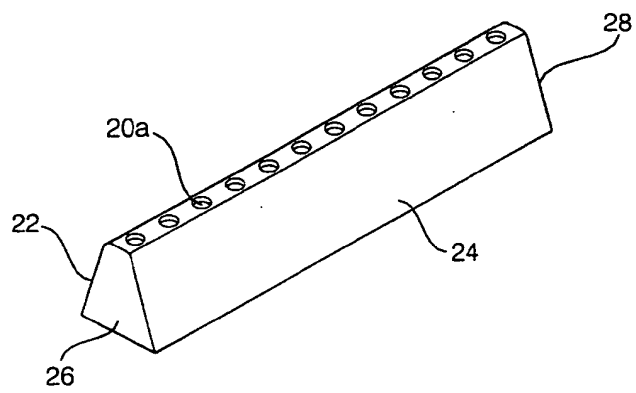


FIG. 3

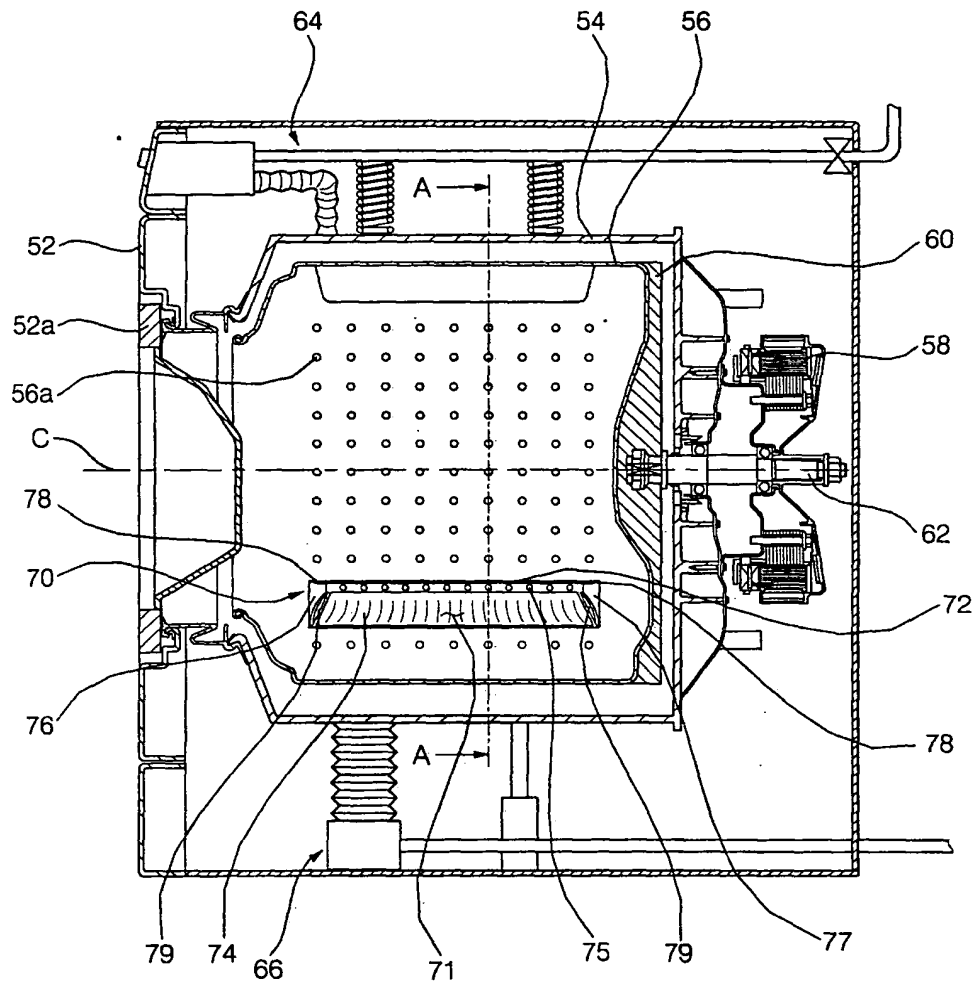




FIG. 4

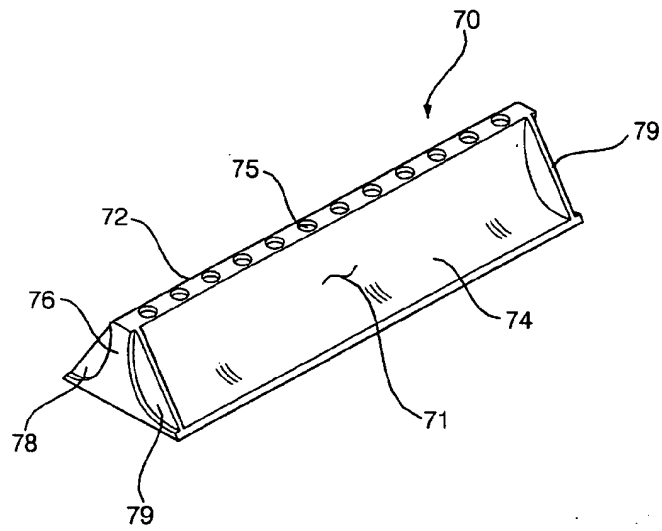


FIG. 5A

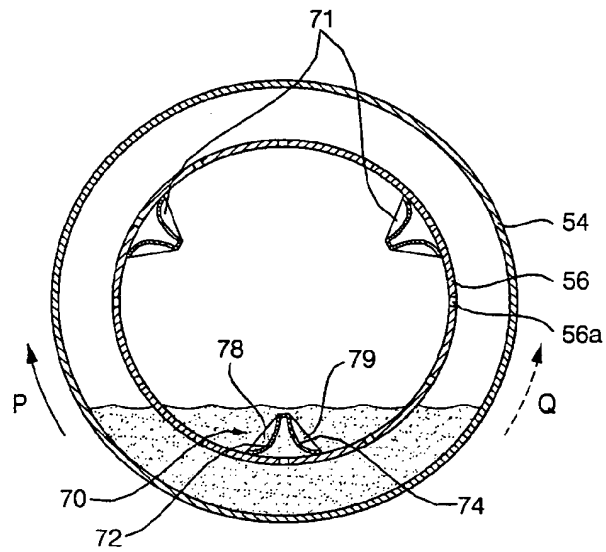


FIG. 5B

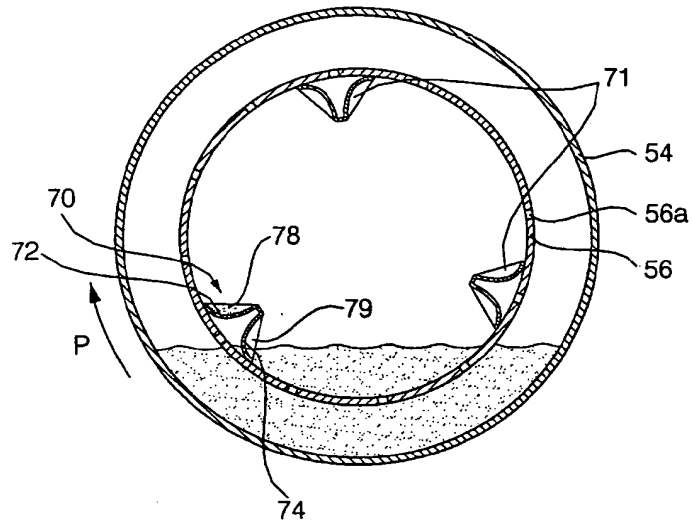
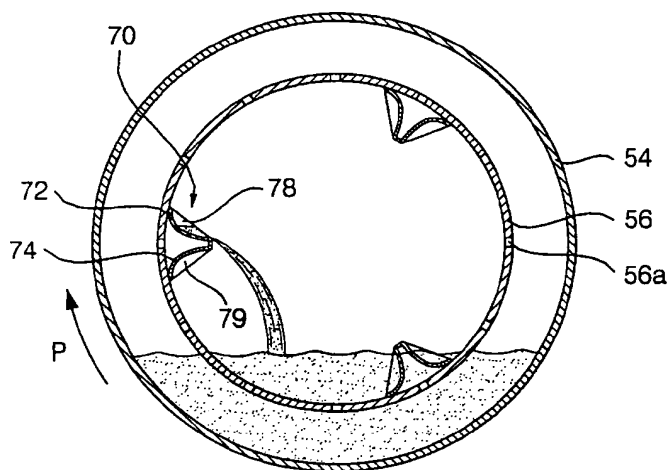


FIG. 5C





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 03 02 8568

DOCUMENTS CONSIDERED TO BE RELEVANT			
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X	US 2002/083743 A1 (HEYDER REINHARD ET AL) 4 July 2002 (2002-07-04) * the whole document *	1,4	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D06F
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 31 March 2004	Examiner Spitzer, B
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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**ABSTRACT:**

CHG DATE=20040706 STATUS=O>Disclosed are a lift

unit for a drum-type washing machine, and a drum-type washing machine comprising the lift unit. The lift unit is protruded from an inner wall of a drum for lifting the laundry in the drum, and comprises a water storage unit formed at at least one side surface of the lift unit for lifting and dropping the wash water when the drum is rotated. The lift unit lifts the wash water to a designated height and then drops the wash water according to the rotation of the drum, thereby circulating the wash water in circumferential and vertical directions of the drum, forming various water currents, and improving washing and rinsing efficiency.